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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,576	02/13/2007	Bernd Reinsch	10191/4202	6681

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EXAMINER	
WILLIAMS, THOMAS J	
ART UNIT	PAPER NUMBER
3657	
MAIL DATE	DELIVERY MODE
01/18/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,576	REINSCH ET AL.	
	Examiner	Art Unit	
	Thomas J. Williams	3657	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 November 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-18 and 20-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-18 and 20-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Acknowledgment is made in the receipt of the amendment filed November 24, 2010.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 15, 17, 18, 21-23, 26, 28-30 and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,509,555 to Chiang et al.

Re-claims 15, 21-23, 26 and 28-30, Chiang et al. disclose a method for manufacturing a composite component, specifically a metal-ceramic component, comprising: producing a porous ceramic blank (the preform is porous and may consist of various ceramics, see column 3 lines 7-13, including ZrO_2); infiltrating the blank with a metal melt (specifically a CuSi melt, see column 4 lines 55-65); converting the additional metal (Si) via a reaction with at least one reactive component of the blank such that a pore space of a ceramic phase is filled with essentially pure copper, see column 3 lines 64-67 to column 4 lines 1-4, the blank is then post heated to a temperature that maintains unreacted infiltrate in liquid form, and as such any unreacted infiltrate liquid may further infiltrate surface areas of the ceramic blank, and as such is interpreted as a post-heating process to further facilitate infiltration.

Re-claims 17 and 18, the silicon copper infiltrate alloy (i.e. metal melt) may be contacted with the ceramic blank at a temperature of 900 ºC, see column 4 lines 55-62, this is below the melting point of copper (stated as being approximately 1083 ºC).

Re-claims 29 and 30, see column 7 lines 48-51 and table 2.

Re-claims 36, 38 and 40, during the post-heating phase as stated previously, a further infiltration may occur at the surface areas, due to the liquid state of the infiltrate.

Re-claim 37, Chiang et al. disclose a method for manufacturing a composite component, comprising: producing a porous ceramic blank; infiltrating and filling the blank with a metal melt (such as CuSi), wherein the metal melt includes an alloy of copper and at least one additional metal (i.e. silicon); and converting the additional metal via a reaction with at least one reactive component of the blank in such a way that a pore space of a ceramic phase is filled with essentially pure copper, see column 3 lines 64-67 to column 4 lines 1-4, wherein the metal melt is infiltrated at a temperature that is lower than a melting point of copper, such as 900 °C, see column 4 lines 55-62.

Re-claim 39, Chiang et al. disclose a metal-ceramic component, comprising: a ceramic phase provided with a pore space filled with essentially pure copper, see column 3 lines 64-67 to column 4 lines 1-4, wherein the ceramic phase includes a conversion product that has a lower specific weight than copper, the conversion product including a reactive ceramic portion and a metal of a copper alloy, wherein the copper alloy is CuSi alloy, and the conversion product is formed by zirconium dioxide ZrO2, see column 3 lines 7-12.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 16, 20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiang et al. in view of US 6,835,349 to Pyzik et al.

Re-claims 16, 20 and 27, Chiang et al. fail to specifically teach the ceramic metal composite (CMC) used as a brake rotor or the porosity of the blank (or preform) being at least 50% by volume. Pyzik et al. teach a ceramic metal composite used to make a brake rotor. The CMC has a blank (or perform) with a porosity of at least 50% by volume, see column 4 lines 34-47. This provides sufficient porosity such that during infiltration of the metal alloy the final CMC product is formed having sufficient strength. It would have been obvious to one of ordinary skill in the art to have utilized the CMC of Chiang et al. to manufacture a brake rotor, and to have utilized a blank having at least a 50% porosity by volume as taught by Pyzik et al., thus ensuring a brake rotor having sufficient strength.

7. Claims 24, 25 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiang et al. in view of US 6,666,310 to Berreth et al.

Re-claims 24, 25 and 31, Chiang et al. fail to teach the ceramic blank or ceramic phase including particles or fibers. Berreth et al. teach a ceramic metal component having a porous

ceramic blank provided with fibers, thereby reinforcing the blank preform and final component. It would have been obvious to one of ordinary skill in the art to have provided the porous ceramic blank of Chiang et al. with fibers as taught by Berreth et al., thus increasing the strength of the ceramic metal component.

8. Claims 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiang et al. in view of US 6,458,466 to Jones et al.

Re-claims 32-35, Chiang et al. fail to teach the fracture toughness or thermal conductivity of the component, even though features would be present. Jones et al. teach a ceramic metal component used for a brake element having a fracture toughness of at least 5.0 $MPam^{1/2}$ and no more than 25 $MPam^{1/2}$, see column 5 lines 1-7, and a thermal conductivity of at least most preferably 25 W/mK and less than 150 W/mK, see column 5 lines 22-28. These values provide good performance ranges for the brake component. It would have been obvious to one of ordinary skill in the art to have provided the component of Chiang et al. with the recited performance ranges as taught by Jones et al., thus enabling the component to function for its intended use.

Response to Arguments

9. Applicant's arguments filed November 24, 2010 have been fully considered but they are not persuasive. As stated above, the procedure, or step of maintaining the infiltrated blank at a temperature sufficient to keep the unreacted infiltrate in liquid form allows this unreacted infiltrate to further infiltrate any surface pores not previously occupied. As such it is the opinion of the examiner that this step disclosed by Chiang et al. fulfills the post-heating recitation. Chiang et al. disclose that the process of infiltrate a ceramic blank with a copper metal melt

infiltrate may be carried out within a temperature range of 900 °C to 1800 °C. Clearly 900 °C is below the stated melting point of copper, and within the cited range of 680 °C and 1000 °C. As such the rejection is maintained.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiries concerning this communication or earlier communications from the examiner should be directed to Thomas Williams whose telephone number is 571-272-7128. The examiner can normally be reached on Wednesday-Friday from 6:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Siconolfi, can be reached at 571-272-7124. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-6584.

TJW

/Thomas J. Williams/
Primary Examiner, Art Unit 3657

January 12, 2011